

We claim:

- 5     1.     A process for the preparation of gabapentin which comprises the steps of:
- (a) reacting a carboxaldehyde selected from the group consisting of  
             cyclohexanecarboxaldehyde and cyclohexenecarboxaldehyde with an  
             amine selected from the group consisting of secondary alkyl and  
             arylalkyl amines;
- 10        (b) reacting the resultant enamine with an alkylating agent having the  
             formula  $Y-CH_2-X$ , wherein Y is a leaving group selected from  
             halogen,  $C_1-C_{10}$  alkane sulfonate, and  $C_5-C_{10}$  arene sulfonate and X is  
             selected from the group consisting of  $-CN$ ,  $-CO_2M$ ,  $-CO_2R_3$  and  $-$   
15         $CONR_4R_5$ , with  $R_3$  to  $R_5$  being independently selected from the group  
             consisting of hydrogen, cyanoethyl, alkyl cycloalkyl, aryl  
             unsubstituted or substituted with electron withdrawing or electron  
             donating groups; arylalkyl unsubstituted or substituted with electron  
             withdrawing or electron donating groups, and M is selected from the  
             group consisting of lithium, sodium, potassium, calcium, magnesium,  
20        trialkylammonium and tetralkylammonium;
- (c) converting the resultant iminium salt to gabapentin.
2.     A method as in Claim 1 wherein  $R^1$  and  $R^2$  are benzyl groups and the conversion  
25     of Step (c) to produce gabapentin is accomplished by direct reductive amination .
3.     A method as in Claim 1 wherein the conversion of Step (c) is accomplished by  
         hydrolysis to an aldehyde followed by reduction to gabapentin.
4.     A method as in Claim 1 in which Step (c) comprises hydrolysis of the iminium  
         salt to an aldehyde wherein X is a benzyl ester, acid or a salt and the conversion to  
30     gabapentin is accomplished by direct reductive amination.

5. A method as in Claim 1 in which Step (c) comprises hydrolysis of the iminium salt to an aldehyde wherein X is other than a benzyl ester, acid or a salt, followed by amination to form the lactam and hydrogenolysis to produce gabapentin.

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6. A process for the preparation of gabapentin which comprises:

- (a) reacting diisobutyl amine and cyclohexanecarboxaldehyde to produce cyclohexylidenemethyl-diisobutyl amine;
- 10 (b) alkylating said cyclohexylidenemethyl-diisobutyl amine by reaction with ethylbromoacetate to produce (1-ethoxycarbonylmethyl-cyclohexylmethylene)-diisobutyl ammonium bromide;
- (c) hydrolyzing said (1-ethoxycarbonylmethyl-cyclohexylmethylene)-diisobutyl ammonium bromide to produce ethyl (1-formylcyclohexyl)acetate;
- 15 (d) subjecting said ethyl (1-formylcyclohexyl)acetate to direct reductive amination to produce gabapentin.

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